INTERNATIONAL SEARCH REPORT

Inte al Application No
PCT/EP2005/002889

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C08J3/00 C08J3/20 C08J3/22 C08K3/02 C08K3/04
C08L79/02 H01L51/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C08J C08K C08L H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,Y	US 2004/021131 A1 (BLANCHET-FINCHER GRACIELA BEATRIZ ET AL) 5 February 2004 (2004-02-05) paragraphs '0011! - '0019!, '0034! - '0054!; claims 1-15; examples 22-34	1-25
X,Y	WO 02/074534 A (EASTMAN CHEMICAL COMPANY) 26 September 2002 (2002-09-26) page 7, line 11 - page 8, line 5 page 11, line 15 - line 17; claims 13,15	1-25
X	WO 89/02155 A (ZIPPERLING KESSLER & CO) 9 March 1989 (1989-03-09) example 12	1-25
Y	US 4 959 180 A (ARMES ET AL) 25 September 1990 (1990-09-25) the whole document	1-25

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 June 2005	20/06/2005

Name and mailing address of the ISA	Authorized officer
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Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

Inte al Application No
PCT/EP2005/002889

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 2004/029133 A (E.I. DU PONT DE NEMOURS AND COMPANY) 8 April 2004 (2004-04-08) the whole document	1-25
P,X	WO 2004/029128 A (E.I. DU PONT DE NEMOURS AND COMPANY) 8 April 2004 (2004-04-08) the whole document	1-25
A	KIEBOOMS R ET AL: "SYNTHESIS, ELECTRICAL, AND OPTICAL PROPERTIES OF CONJUGATED POLYMERS" HANDBOOK OF ADVANCED ELECTRONIC AND PHOTONIC MATERIALS AND DEVICES, vol. 8, 2001, pages 1-102, XP001029240 the whole document	1-25
A	P.NOVAK, K.MÜLLER, K.S.V.SANTHANAM, O.HAAS: "Electrochemically active polymers for rechargeable batteries" CHEMICAL REVIEWS, vol. 97, 1997, pages 207-281, XP002330853 the whole document	1-25

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int I Application No
PCT/EP2005/002889

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004021131 A1	05-02-2004	AU 2003223198 A1	16-09-2003
		EP 1483320 A2	08-12-2004
		WO 03074601 A2	12-09-2003
WO 02074534 A	26-09-2002	US 2002176991 A1	28-11-2002
		CN 1535205 A	06-10-2004
		EP 1377445 A1	07-01-2004
		JP 2004526596 T	02-09-2004
		WO 02074534 A1	26-09-2002
WO 8902155 A	09-03-1989	DE 3729566 A1	16-03-1989
		AT 145493 T	15-12-1996
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		DE 3855678 D1	02-01-1997
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		EP 0329768 A1	30-08-1989
		JP 8019336 B	28-02-1996
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		KR 136280 B1	15-06-1998
		US 5567355 A	22-10-1996
US 4959180 A	25-09-1990	NONE	
WO 2004029133 A	08-04-2004	AU 2003279014 A1	19-04-2004
		WO 2004029133 A1	08-04-2004
		US 2004127637 A1	01-07-2004
		US 2004222413 A1	11-11-2004
WO 2004029128 A	08-04-2004	AU 2003275203 A1	19-04-2004
		WO 2004029128 A2	08-04-2004
		US 2004102577 A1	27-05-2004

REC'D 04 APR 2006
WIPO PCT

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 68146	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2005/002889	International filing date *(day/month/year)* 17.03.2005	Priority date *(day/month/year)* 18.03.2004

International Patent Classification (IPC) or national classification and IPC
C08J3/00, C08J3/20, C08J3/22, C08K3/02, C08K3/04, C08L79/02, H01L51/30

Applicant
ORMECON GMBH et al.

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 4 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
12.01.2006	03.04.2006

Name and mailing address of the international preliminary examining authority:

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2005/002889

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:

   ☐ international search (under Rules 12.3 and 23.1(b))
   ☐ publication of the international application (under Rule 12.4)
   ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages	
1-30	as originally filed
Claims, Numbers	
1-24	received on 11.01.2006 with letter of 11.01.2006
Drawings, Sheets	
1/12-12/12	as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-24
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-24
Industrial applicability (IA)	Yes:	Claims	1-24
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The amendments filed with letter dated 11.01.2006 conform to Article 34(2)(b) PCT.

2. Reference is made to the following documents:
   - D1: US 2004/021131 A1 (BLANCHET-FINCHER GRACIELA BEATRIZ ET AL) 5 February 2004 (2004-02-05)
   - D2: WO 02/074534 A (EASTMAN CHEMICAL COMPANY) 26 September 2002 (2002-09-26)
   - D3: WO 89/02155 A (ZIPPERLING KESSLER & CO) 9 March 1989 (1989-03-09)
   - D4: US-A-4 959 180 (ARMES ET AL) 25 September 1990 (1990-09-25)
   - D5: KIEBOOMS R ET AL: "SYNTHESIS, ELECTRICAL, AND OPTICAL PROPERTIES OF CONJUGATED POLYMERS" HANDBOOK OF ADVANCED ELECTRONIC AND PHOTONIC MATERIALS AND DEVICES, vol. 8, 2001, pages 1-102, XP001029240
   - D6: P.NOVAK, K.MÜLLER, K.S.V.SANTHANAM, O.HAAS: "Electrochemically active polymers for rechargeable batteries" CHEMICAL REVIEWS, vol. 97, 1997, pages 207-281, XP002330853
   - D7: WO 2004/029133 A (E.I. DU PONT DE NEMOURS AND COMPANY) 8 April 2004 (2004-04-08)
   - D8: WO 2004/029128 A (E.I. DU PONT DE NEMOURS AND COMPANY) 8 April 2004 (2004-04-08)

3. The application does not meet the requirements of Article 6 PCT because the term "ambient conditions" in claim 12 is vague and unclear and leaves the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claim 12 unclear. The Applicant should clarify what is to be understood by the term "ambient conditions".
   Attention is drawn to the fact that the concept "ambient conditions" is not universally standardised (cf. Table 1). The Applicant should at least clarify which standard of which organisation is being followed.
   Furthermore, the Applicant should note that the 250°C of example 2 (page 25, lines

1-2) and the 100°C of example 3 (page 25, last sentence) do not exactly correspond with what is generally to be considered within "small deviations from standard values".

Table 1: Standard reference conditions in current use

Temperature	Absolute pressure	Relative humidity	Publishing or establishing entity
°C	kPa	% RH	
0	100.000		IUPAC (post-1997)
0	101.325		IUPAC (pre-1997), NIST, ISO
15	101.325	0	ISA, ISO, EEA, EGIA
20	101.325		EPA, NIST
25	101.325		EPA
25	100.000		SATP
20	100.000	0	CAGI
15	100.000		SPE

The full names of the entities listed in Table 1:
IUPAC: International Union of Pure and Applied Chemistry
NIST: National Institute of Standards and Technology
ISA: ICAO's International Standard Atmosphere
ISO: International Organization for Standardization
EEA: European Environment Agency
EGIA: Electricity and Gas Inspection Act (of Canada)
EPA: U.S. Environmental Protection Agency
SATP: Standard Ambient Pressure and Temperature
CAGI: Compressed Air and Gas Institute
SPE: Society of Petroleum Engineers

4. The subject-matter of claims 1-24 is new in the sense of Article 33(2) PCT.

None of the cited prior art D1-D8 discloses the composition of claim 1.

5. The subject-mater of claims 1-24 does not involve an inventive step (Article 33(3) PCT).

D1 can be selected as closest prior art because it relates to compositions comprising carbon nanotubes for the manufacture of electronic elements.
The difference between D1 and the application is that the compositions of the application comprise carbon black.
The problem to be solved is that of providing an improved composition which can be manufactured in a reproducible manner and shows superior performance values for the manufacture of supercapacitors (page 10, 3rd paragraph).

The effect of improved charging capacity of the compositions according to the invention, which are between 40 and 250 F/g, whereas under the same test conditions the charging capacity of the comparative example is about 4.7 F/g are the result of the presence or absence, respectively, of a conducting polymer such as polyaniline. The effect shown in these examples is therefore not the consequence of replacing carbon nanotubes with carbon black, but rather the consequence of adding a conductive polymer to carbon black containing compositions.

The skilled person of D1 with the aim of improving his composition will either replace the conducting polymer with a suitable alternative or try to find suitable alternative conductive fillers to replace the carbon nanotubes. D2 (page 7, lines 20 - 30) discloses that carbon black is an exemplary conductive filler. The skilled person of D1 would therefore try to replace the carbon nanotubes with carbon black in order to improve his compositions and thus arrive at the subject-matter of the present invention. In addition it should be noted that carbon black is a generally and commonly known conductive filler.

Therefore, the compositions of the present application and the method of preparing them are considered as obvious alternatives in view of D1 in combination with D2 and the common knowledge that carbon black is a conductive filler.
Therefore, the subject-matter of claims 1-24 does not involve an inventive step

according to Article 33(3) PCT.

Claims

1. A composition capable of forming a coating and comprising a mixture of a conductive polymer in colloidal form, ~~and carbon~~ <-> and a liquid dispersion medium

2. The composition according to claim 1, wherein the conductive polymer is selected from polymers of anilines, thiophenes, pyrroles and substituted derivatives thereof.

3. The composition according to claim 1 or claim 2, wherein two or more different conductive polymers are present.

4. The composition according to any one of the preceding claims, wherein the carbon black has a specific surface area of more than 100 m^2/g, as measured according to the BET method.

~~5. The composition according to any one of the preceding claims, wherein the carbon is selected from graphite, carbon black, nanotubes and fullerenes.~~

5 ~~6.~~ The composition according to claim 1, wherein the carbon black is active carbon black.

6. ~~7.~~ The composition according to claim 5, wherein the active carbon black has a specific surface of greater than 750 m^2/g.

7. ~~8.~~ The composition according to any one of the preceding claims, wherein the average particle size (number average) of the conductive polymer is smaller than 500 nm.

8. ~~9.~~ The composition according to any one of the preceding claims, wherein the conductivity of the conductive polymer is greater than 10^{-5} S/cm.

9. 10. The composition according to claim 8, wherein the conductivity is greater than 10 S/cm.

10. 11. The composition according to claim 9, wherein the conductivity is greater than 100 S/cm.

11. 12. The composition according to any one of the preceding claims, wherein the weight ratio of the conductive polymer to carbon is in the range of from 1 : 50 to 50 : 1.

12. 13. The composition according to any one of the preceding claims, ~~further~~ comprising the liquid dispersion medium in a concentration of from 40 to 99.5 weight percent, wherein the dispersion medium liquid is evaporable under ambient conditions, and further comprising other non-evaporable additives in a concentration of from 0 to 10 weight percent, the conductive polymer and carbon components being present in a concentration of from 0.5 to 60 weight percent, all weight percentages being based on the total composition.

13. 14. The composition according to claim 12, wherein the liquid dispersion medium comprises water and/or organic solvent(s).

14. 15. A method for manufacture of a composition according to any one of the preceding claims, comprising dispersing the conductive polymer and carbon, and optionally additives in a liquid dispersion medium and optionally drying the liquid dispersion after application on a substrate.

15. 16. The method of claim 14, wherein the conductive polymer is dispersed in a first liquid and the carbon is dispersed separately in a second liquid, said liquids being the same or different, and the respective dispersions are subsequently mixed together, optional additives being added before, during or after the separate dispersion steps.

16. 17. The method of claim 14 15, wherein the conductive polymer is dispersed in a liquid and the carbon is separately milled in the absence of liquid, and wherein the dry milled carbon is subsequently added to the liquid colloidal dispersion of the conductive polymer and dispersed therein.

17. 18. A composite material comprising the composition according to any one of claims 1 to 13 14 or the composition obtained by the method of any one of claims 14 15 to 16 17 in the form of a coating on a substrate.

18. 19. The composite material of claim 17 18, wherein the substrate is selected from the group consisting of metals, semiconductors, plastics, ceramics and wood products.

19. 20. An electrical or electronic article comprising the composition according to any one of claims 1 to 13 14 or the composite material according to claim 17 18 or claim 18 19.

20. 21. The article of claim 19 20, wherein the article is selected from the group consisting of conductors, energy stores, sensors, switches, condensers, capacitors and supercapacitors, double layer capacitors and redox capacitors.

21. 22. The article of claim 20 21, said article being a capacitor comprising an electrolyte and a pair of electrodes with a separator disposed therebetween, wherein at least one of the electrodes comprises the composition according to any one of claims 1 to 13 14 or the composite material according to claim 17 18 or claim 18 19.

22. 23. The capacitor of claim 21 22, wherein both electrodes comprise the composition according to any one of claims 1 to 13 14 or the composite material according to claim 17 18 or claim 18 19.

23. ~~24.~~ The capacitor of claim ~~22~~ 21, wherein one electrode comprises the composition according to any one of claims 1 to ~~14~~ 13 or the composite material according to claim 17 or claim 18 and the other electrode is a conventional capacitor electrode.

24. ~~25.~~ The capacitor of claim ~~24~~ 23, wherein the other electrode comprises a current collector coated with a composition containing an intrinsically conductive polymer but no carbon.